

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCTP171499A	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/NL 03/00926	International filing date (day/month/year) 23.12.2003	Priority date (day/month/year) 23.12.2002
International Patent Classification (IPC) or both national classification and IPC B29D30/42		
Applicant VMI EPE HOLLAND B.V. et al.		



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 10 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 10 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 22.07.2004	Date of completion of this report 06.05.2005
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INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

International application No. PCT/NL 03/00926

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-23 as originally filed

Claims, Numbers

1-40 received on 21.04.2005 with letter of 20.04.2005

Drawings, Sheets

1/8-4/8, 6/8-8/8 as originally filed

5/8 received on 21.04.2005 with letter of 20.04.2005

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 39,40

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 39,40 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos.

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the Standard.

☐ the computer readable form has not been furnished or does not comply with the Standard.

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

☐ restricted the claims.

☐ paid additional fees.

☐ paid additional fees under protest.

☒ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

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4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

☐ all parts.☒ the parts relating to claims Nos. 1-30 .**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Yes: Claims	1-30
	No: Claims	
Inventive step (IS)	Yes: Claims	1-30
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-30
	No: Claims	

2. Citations and explanations**see separate sheet**

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Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. Claims 39 and 40 contain references to the description and the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

Re Item IV

Lack of unity of invention

1. This Authority considers that there are two inventions covered by the claims indicated as follows:

I: Claims 1 - 30 directed to an apparatus and a method for producing a breaker ply comprising a controlling device and a process step for adjustably moving the ply support surface of the ply transport device in accordance with the actual length of the ply being measured during its manufacturing.

II: Claims 31 - 38 directed to an apparatus for producing two breaker plies comprising two cutting devices having their cutting lines parallel one to the other.

The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows.

2. The prior art has been identified as document D1 (= EP 1095761 - A) and discloses:
an apparatus and a method for producing a breaker ply comprising a controlling device and a process step whereby the mutual distance of the bands, placed adjacent one to another in order to obtain a breaker ply of a predetermined length, is adjusted a priori.
3. The technical features of claims 1 - 30 which make a contribution over the prior

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art and can be considered as special technical features within the meaning of Rule 13.2 PCT are:

the provisions of a controlling device for, and of a process step of moving in a controlled manner the ply support surface of the ply transporting device, depending on the actual length of the ply being measured during its manufacturing.

4. The problem solved by these special technical features can therefore be construed as:

improving the accuracy and uniformity of the completed tyre breaker ply thanks to the repetitive measurements, recalculations and adjustments of the ply transporting device carried out every time a new band is placed adjacent to the previous one.

5. The technical features of claims 31 - 38 which make a contribution over the prior art and can be considered as special technical features within the meaning of Rule 13.2 PCT are:

the provision of two cutting devices having their cutting lines parallel one to the other.

6. The problem solved by these special technical features can therefore be construed as the following:

a more compact arrangement of the belt ply production station and a faster production cycle is achieved because only one extrusion device can be used to produce two breaker plies substantially at the same time.

7. Comparing the content of paragraphs 3 with 5 and 4 with 6 respectively, it is evident the difference between the special technical features of the two groups of claims and the lack of corresponding technical effect as well.

8. Consequently, neither the objective problem underlying the subjects of the claimed inventions, nor their solutions defined by the special technical features allow for a relationship to be established between the said inventions, which involves a single general inventive concept.

The application, hence does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT.

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Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Remarks on the lack of clarity of certain claims, Art. 6 PCT.

Throughout the claims a certain number of mistakes, inaccuracies and confusing expressions have been remarked, which render the comprehension of the claims rather cumbersome.

They are listed below and, when possible, a plausible interpretation is given.

- 1.1 In claim 1, the expression "first operator" has been interpreted as "first control device" (and not as a person): this is derivable from the description at page 5 lines 14-24. The same considerations apply to claims 2, 4-6 and 11.
- 1.2 Dependent claim 22, when considered in combination with claims 21, 20 and 1, is not clear because there is a reference to a "placement device", which has not been defined in any of the said claims 21, 20 and 1.
- 1.3 Although claims 23 and 26 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.
- 1.4 The formulation of claims 24 and 25 as dependent on themselves is meaningless; it seems reasonable to interpret:
- claim 24 as dependent on claim 23, and
 - cl. 25 dependent on cl. 24.

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- 1.5.1 The subject-matter of independent claims 1, 23 and 26 respectively relates to an apparatus for, and to methods of manufacturing a breaker ply by:
- cutting a continuous rubber strip containing cords into a plurality of bands having a certain length, and
 - joining side by side a certain number of said bands to form a breaker ply having a certain length.
- 1.5.2 However, these claims fail to explicitly disclose either the provision of a joining device (e.g. a splicer) or the provision of a joining step, for joining the said bands together to form a breaker ply: these features are considered essential to the definition of the invention.
- 1.5.3 Since independent claims 1, 23 and 26 do not contain these features, they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT, that any independent claim must contain all the technical features essential to the definition of the invention.
- 1.5.4 However, for the examination purpose, these claims have been interpreted as implicitly disclosing respectively a joining device (e.g. a splicer) and a joining step, for joining the bands together to form a breaker ply.

2. State of the ArtReference is made to the following document: **D1: EP 1095761 - A.****3. Claim 1**

- 3.1 The document **D1** is regarded as being the closest prior art to the subject-matter of claim 1 and discloses (the references in parentheses applying to this document):
- "a device for producing a breaker ply (3) comprising:

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- an extrusion device (15) for producing at least one continuous rubber strip (1) having substantially mutually parallel embedded longitudinal cords (11) having a centre-to-centre distance and having a strip width;
 - a first transport device (16) for transporting the continuous rubber strip in the direction of the longitudinal cords;
 - a second transport device (20) for transporting the breaker ply (3) in the longitudinal direction of the breaker ply in a transport direction, comprising a support surface for the breaker ply;
 - a cutting device (17) for cutting bands from the continuous strip (1) diagonally at the cord angle;
 - a building drum (41) for receiving the breaker ply (3) coming from the second transport device (20), wherein the building drum has an axis of rotation,
 - wherein the first transport device (16) is adapted for transporting the continuous strip to the second transport device (20), the second transport device is positioned with its transport direction at an angle having the size of a cord angle to the direction of the longitudinal cords, the longitudinal direction of the breaker ply substantially corresponds to the transport direction, and the building drum (41) is positioned with its axis of rotation substantially transverse to the second transport direction".
- See D1, figure 1 and the relevant passages in the description.

3.2 The subject-matter of claim 1 differs from D1 in the additional provisions of a controlling device (in the claim defined as "a first operator") for adjustably moving the breaker ply support surface of the second breaker ply transporting device, essentially depending on the actual length of the breaker ply being measured during its manufacturing.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

3.3 The problem solved by this distinguishing feature can therefore be construed as: improving the accuracy and uniformity of the completed tyre breaker ply thanks to the repetitive measurements, recalculations and adjustments of the breaker ply transporting device, which are carried out every time a new band is placed adjacent to the previous one.

3.4 The problem underlying the present application has not been acknowledged by the

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available prior art; the solution proposed by claim 1 is neither known from, nor rendered obvious by, the available prior art.

Therefore, claim 1 is considered as involving an inventive activity according to Article 33(3) PCT.

4. Claims 23 and 26

4.4 The subject-matters of independent method claims 23 and 26 differ from D1 in the provision of the following additional process steps:

- measuring the actual length of the breaker ply during its manufacture, i. e. every time a new band length is joined to the previous one to form the breaker ply, and
- adjustably moving the ply support surface of the ply transporting device in accordance with the measured actual length of the ply.

The subject-matter of claims 23 and 26 is therefore new (Article 33(2) PCT).

4.5 The same considerations as at points 3.3 and 3.4 above can be applied to justify the inventiveness of claims 23 and 26 according to Article 33(3) PCT.

5. Dependent claims 2 - 22, 24, 25, 27 - 30

Claims 2 to 22 are dependent on claim 1, claims 24 and 25 are dependent on claim 23, and claims 27 to 30 are dependent on claim 26: all these claims, as such, also meet the requirements of the PCT with respect to novelty and inventive step.

Claims (amended)

1. Device for producing a breaker ply having a longitudinal axis, a breaker ply length and mutually parallel cords at a pre-set cord angle to the longitudinal axis, wherein the device comprises:

- an extrusion device for producing at least one continuous rubber strip having substantially mutually parallel embedded longitudinal cords having a centre-to-centre distance and having a strip width;
- a first transport device for transporting the continuous rubber strip in the direction of the longitudinal cords;
- a second transport device for transporting the breaker ply in the longitudinal direction of the breaker ply in a transport direction, comprising a support surface for the breaker ply;
- a cutting device for cutting bands from the continuous strip diagonally at the cord angle;
- a building drum for receiving the breaker ply coming from the second transport device, wherein the building drum has an axis of rotation,

wherein the first transport device is adapted for transporting the continuous strip to the second transport device, the second transport device is positioned with its transport direction at an angle having the size of a cord angle to the direction of the longitudinal cords, the longitudinal direction of the breaker ply substantially corresponds to the transport direction, and the building drum is positioned with its axis of rotation substantially transverse to the second transport direction, wherein the second transport device is provided with a first drive and a first operator for operating the first drive, wherein the operator is adapted for controlling the drive for adjustably moving the support surface of the second transport device with an adjustable

transfer distance for positioning the next band, or a transport distance for transporting the breaker ply towards the building drum.

2. Device according to claim 1, wherein the operator comprises a memory for the strip width, the centre-to-centre distance between the longitudinal cords and the breaker ply length and a calculating unit for calculating a band number, being the necessary number of bands to form a breaker ply, and the transfer distance from the centre-to-centre distance, the strip width and the breaker ply length.

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3. device according to claim 2, wherein said transfer distance is calculated for each breaker ply again.

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4. Device according to claim 3, wherein the operator comprises a counter for counting the number of bands placed, and a decision routine for deciding to transport the breaker ply to the building drum when the number of bands placed equals the band number, or when the breaker ply length has been reached.

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5. Device according to any one of the preceding claims, further comprising a measuring unit for measuring the length of the breaker ply on the support surface of the second transport device during making the breaker ply, connected to the operator.

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6. Device according to claim 2-5, wherein the operator is adapted for adjusting the transfer distance based on the measured length of the breaker ply during manufacturing it, the set breaker ply length and the set centre-to-centre distance between the longitudinal cords.

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7. Device according to any one of the preceding claims, wherein the first transport device furthermore comprises a placement device for picking up the continuous rubber strip or bands from the first transport device and placing it

or them on the support surface of the second transport device.

5 8. Device according to claim 7, wherein the placement device is positioned after the cutting device for placing the continuous rubber strip on the support surface.

9. Device according to claim 7 or 8, wherein the placement device is provided with a splicer for splicing the bands together into a breaker ply.

10 10. Device according to any one of the preceding claims, wherein the second transport device comprises a transfer device for transferring the support surface to the building drum for placing the breaker ply against the building drum.

15 11. Device according to any one of the preceding claims, wherein the second transport device comprises a first conveyor and a second conveyor, wherein the conveyors are positioned with their transport directions in line, wherein the first conveyor comprises a support surface for receiving the bands or continuous rubber strip and a drive connected to the operator,

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12. Device according to claim 11, wherein the second conveyor comprises a support surface for supporting the breaker ply, wherein the support surface of the second conveyor is movable from a first position, in which the support surface of the first conveyor lies in line with the support surface of the
25 second conveyor, to a second position, in which the support surface rests against the building drum.

30 13. Assembly for manufacturing a breaker for a tyre, comprising two devices according to any one of the preceding claims for almost simultaneously manufacturing two breaker plies, wherein the second transport devices of the devices for manufacturing a breaker ply, with their transport directions are positioned substantially parallel to each other.

14. Assembly according to claim 13, wherein the building drums of the first and second device for manufacturing a breaker ply, with their axes of rotation are positioned substantially in line, and are mounted on a common building drum holder so as to be jointly rotatable about an axis substantially perpendicular to the axis of rotation.

15. Assembly according to claim 13 or 14, wherein the extrusion devices of both devices for manufacturing a breaker ply, with their extrusion devices are positioned substantially parallel to each other.

16. Assembly according to any one of the claims 13-15, wherein the second transport devices of both devices for manufacturing a breaker ply each comprise a support surface for supporting and transferring a breaker ply, wherein both support surfaces are movable to the building drums of the respective devices for manufacturing a breaker ply, wherein one support surface is movable to the upper side of the building drum for arranging a front side of a breaker ply on the upper side of the building drum, and the other support surface is movable to the lower side of the other building drum for arranging the front side of a breaker ply on the lower side of said building drum.

17. Device according to any one of the preceding claims 1-12, furthermore comprising a third transport device, having its transport direction substantially parallel to the transport direction of the second transport device, and a second cutting device for cutting the continuous rubber strip substantially parallel to the first cutting device.

18. Device according to claim 17, wherein the second cutting device is arranged for cutting between the second and third transport device.

19. Device according to claim 17 or 18, wherein the third conveyor

comprises a support surface for a breaker ply, situated adjacent to and consecutive to the support surface of the second conveyor.

5 20. Device according to any one of the preceding claims, furthermore provided with a main operation device, wherein the main operation device comprises a memory and a data processing unit, an input unit for setting the centre-to-centre distance between the longitudinal cords and a breaker ply length and software for reading a set centre-to-centre distance between the longitudinal cords and the breaker ply length.

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21. Device according to claim 20, wherein the software is provided with a distance routine for calculating the target mutual distance between the bands from the band width, the centre-to-centre distance between the longitudinal cords and the set breaker ply length.

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22. Device according to claim 21, wherein the software is furthermore provided with operation routines for operating the placement device for transferring a partly formed breaker ply, wherein the transfer is calculated by means of the distance routine for calculating the mutual distance between the bands.

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23. Method for producing a breaker ply having a longitudinal axis, a breaker ply length and mutually parallel cords at a pre-set cord angle to the longitudinal axis, wherein a continuous rubber strip provided with substantially parallel longitudinal cords, a set strip width and set centre-to-centre distance between the longitudinal cords one to the other, is produced in the longitudinal direction by means of an extrusion process, the continuous rubber strip is cut into bands at the cord angle, a predetermined number of bands with cords substantially parallel and adjacent to each other at a set band distance with respect to each other for forming a breaker ply having a pre-set breaker ply length are placed on a support surface, wherein the mutual distance of the bands is calculated to obtain a set length of the

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breaker ply, when the breaker ply has reached the target breaker ply length the breaker ply is transported in longitudinal direction to a building drum, and is wound on the building drum, wherein a predetermined mutual centre-to-centre distance of the cords and the width of the continuous strip is set, the
5 length of the breaker ply is measured during manufacturing, and the mutual distance of the bands is each time adjusted for realising a pre-set breaker ply length, wherein the adjustment of the mutual distance at the most is the centre-to-centre distance of the cords, preferably at the most 20% of the centre-to-centre distance.

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24. Method according to claim 24, wherein the centre-to-centre distance and the target length of the breaker ply is entered into a computer provided with operation software, wherein the operation software calculates the distance between the bands.

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25. Method according to claim 25, wherein the operation software regulates the transfer of an already formed part of the breaker ply.

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26. Method for building a breaker ply, wherein a continuous rubber strip provided with cords is produced in the longitudinal direction by means of an extrusion process, the continuous strip is cut into bands at a cord angle, the bands are placed adjacent to each other on a support surface the cords one to the other being almost parallel and at a mutual band distance in order for several bands together to form a breaker ply having a pre-set length, the
25 breaker ply on the support surface is transported to a building drum and is wound onto the building drum, wherein the mutual band distance is determined once again for each band of the breaker ply.

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27. Method according to claim 26, wherein the building drum after arranging
30 a first breaker ply is rotated about an axis perpendicular to the axis of rotation of said building drum.

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28. Method according to claim 27, wherein the building drum is rotated in the horizontal plane.

5 29. Method according to claim 27 or 28, wherein a second breaker ply is arranged over the first breaker ply, wherein the cords of the first and second breaker ply are crossed with respect to each other.

10 30. Method according to claim 28, wherein the first and second breaker ply are supplied to the building drum with the cord angle in the same direction, wherein the one breaker ply is secured at the upper side of the building drum and is wound around the building drum in a first winding direction, and the other breaker ply is secured at the lower side of the building drum and is wound around the building drum counter to the first winding direction.

15 31. Device for almost simultaneously producing at least two breaker plies for a belt, wherein each breaker ply has a longitudinal axis, a breaker ply length and mutually parallel cords at a pre-set cord angle to the longitudinal axis, wherein the device comprises:

- 20 - an extrusion device for producing at least one continuous rubber strip having substantially mutually parallel embedded longitudinal cords having a centre-to-centre distance and having a strip width;
- at least two cutting devices for diagonally at a cord angle cutting bands from the continuous strip along a cutting line, wherein the cutting devices are positioned with their cutting lines practically
- 25 parallel;
- at least one strip transport device for transporting the continuous rubber strip substantially in the direction of the longitudinal cords;
- a second and third transport device, each for transporting a breaker ply substantially in the longitudinal direction of the breaker ply in a
- 30 transport direction, each comprising a support surface for the breaker ply, and positioned with their transport directions substantially parallel;
- at least one building drum having an axis of rotation, for receiving a

breaker ply coming from the second transport device and a breaker ply coming from the third transport device, wherein the strip transport device is adapted for transporting the continuous strip to the second and third transport device, the second and third transport device are positioned with their transport direction at an angle the size of the cord angle to the direction of the longitudinal cords, the longitudinal direction of the breaker plies substantially corresponds to the transport direction, and the building drum with its axis of rotation is positioned substantially transverse to the second and third transport direction.

32. Device according to claim 31, wherein the extrusion device is adapted for simultaneously producing at least two rubber strips.

33. Device according to claim 31 or 32, wherein the second and third transport device are positioned above one another, preferably with their support surfaces practically parallel.

34. Device according to claim 31-33, wherein the device is furthermore provided with an operator connected to the drive of the second transport device and the drive of the third transport device, the cutting devices and the building drum for the.

35. Device according to claims 31-34, wherein the one transport device is positioned with below and the other above the axis of rotation of the building drum or building drums.

36. Device according to claims 31-35, furthermore comprising at least two placement devices, each for picking up bands from the first transport device and transferring and placing them in the longitudinal direction of the cords on the second and third transport device, respectively.

37. Device according to claim 31-36, wherein the second and third transport

device each are provided with a placement device to transfer at least a part of the transport device in turns to a building drum to arrange a breaker ply against the building drum.

- 5 38. Device according to claims 31-37, comprising two strip transport devices, having their transport directions mutually substantially parallel.

39. Device comprising one or more of the characterising measures described in the description and/or shown in the drawings.

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40. Method comprising one or more of the characterising measures described in the description and/or shown in the drawings.

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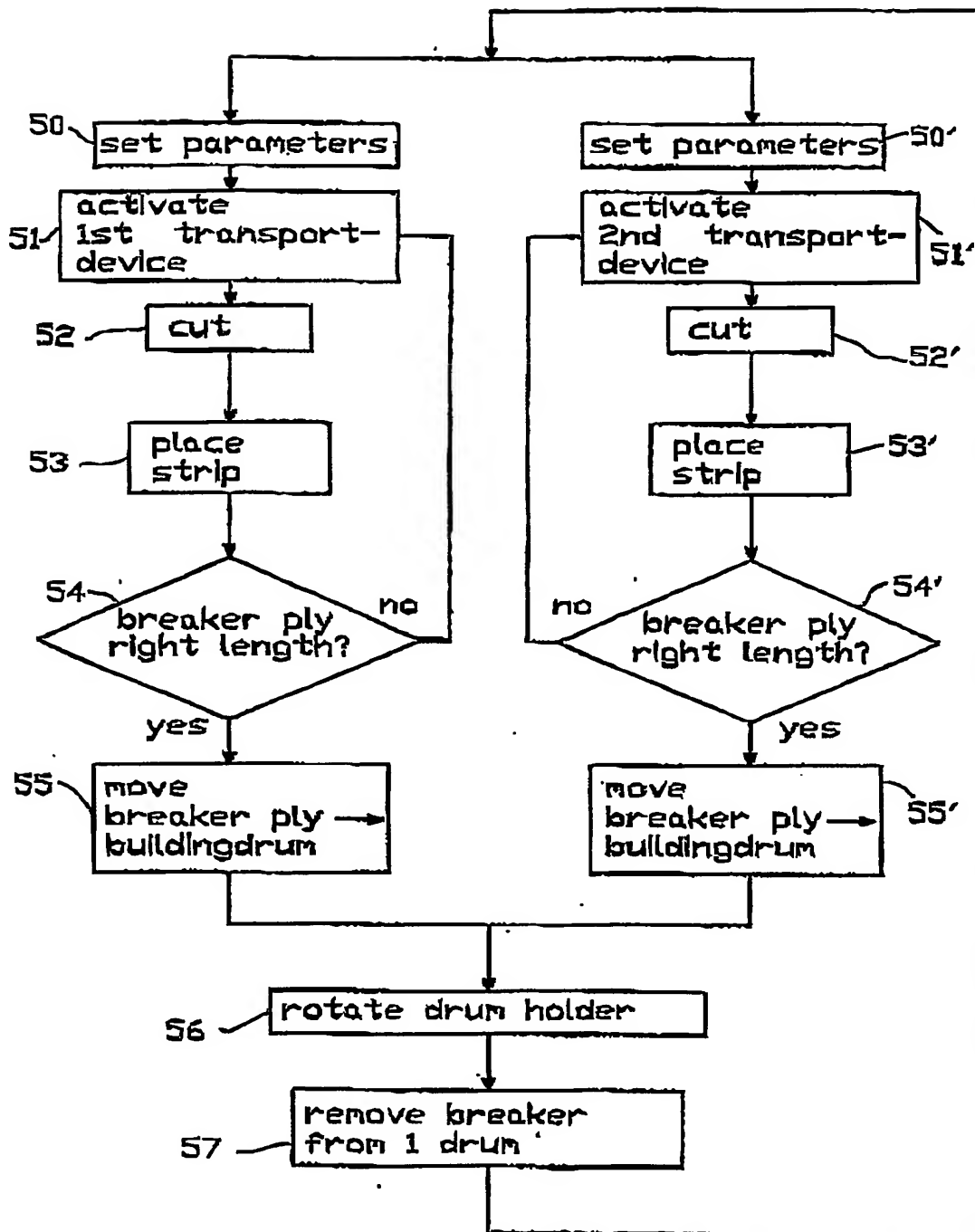


FIG. 5